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AUTHOR Chan, Christina
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ABSTRACT

This paper offers teachers basic information about sensory integration and suggests strategies for managing classrooms which include children with sensory integrative dysfunction. The first section looks at what sensory integration is, noting especially the roles of the three "near senses": the vestibular system, the proprioceptive system, and the tactile system. Next, sensory integrative dysfunction in children is considered, including the hyporesponsive child and the hyperresponsive child. Specific ways that sensory integration dysfunction can become a problem in the classroom are considered, including problems with peers, with controlling aggression, with motor planning, and with maintaining alertness. Suggestions for classroom management while managing a child with sensory integrative dysfunction are offered, including suggestions for setting up the classroom, managing instructional time, and being flexible in teaching styles. Teachers are urged to seek the support of colleagues, administrators, parents, and providers of support services. (Contains 21 references.) (DB)

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Dealing with Sensory Integrative Dysfunction in the Classroom:

A guide for early elementary teachers

Presented by Christina Chan

at the College of Arts and Sciences

Student Research Conference,

The American University

February 25, 1995

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*****The research for this project was made possible through the generous time and resources given by several individuals. Professor Donna Hart was most helpful in introducing me to the subject of sensory integration and its role in elementary classrooms. Dr. Hart was also most helpful in introducing me to the many people to whom I am grateful for the first-hand experience with sensory integrative dysfunction. Carol Kranowitz, Karen Strimple and their dedication to detecting sensory integrative dysfunctions in their students at St. Columba's Preschool in Washington D.C. provided my initial introduction to SI dysfunctions. Linda Nolan, Brenda Wilkins, and the staff at the Washington Developmental Center were essential in allowing me to see SI actively play a role in the many occupational therapy sessions in which I was able to participate. Finally, Catherine Hotstetler and the occupational therapy staff at the Lab School were most helpful in opening their resources to me in my attempt to scour the research available on sensory integrative dysfunctions. Without the help of the individuals listed above, this paper would not have been possible.

Dealing with Sensory Integrative Dysfunction in the Classroom:

A guide for early elementary teachers

Every early childhood teacher has dealt with sensory integrative dysfunctional children before. They are the children who are so clumsy that they cannot perform certain tasks without tripping or dropping things repeatedly. They are the children who are constantly all over everything and everybody. They are constantly in motion, and they are the children who may refuse to take part in certain art activities, to eat certain foods or to wear certain materials.

Although very diverse in behavior, these children have one thing in common: sensory integrative (SI) dysfunctions. SI dysfunctions are disorders of neurological development that hinder not only children's ability to learn but also their ability to interact effectively with other children and to function appropriately within the classroom. Therefore, children with SI dysfunctions will inevitably cause difficulty in managing a classroom and will present a problem to teachers who are not well versed in the parameters of this dysfunction and the ways in which these children must be accommodated.

It is in the early school years that children, in whom the neurological development of sensory integration systems is not complete, will encounter difficulties in functioning properly within the classroom. During these years children with SI dysfunctions will be struggling to cope simultaneously with their deficiencies and also with the increasing demands of more extensive classroom rules and regulations and more complex intellectual

tasks. The demands on an SI dysfunctional child at this stage are therefore nothing short of overwhelming, leading at times to an inability to function appropriately in the classroom.

It is therefore crucial that early childhood educators are equipped with the knowledge necessary to determine when these patterns of behavior are caused by SI dysfunctions. This is important for many reasons. First, the behavior of children with sensory integrative dysfunction can many times be misconstrued as merely inappropriate and disruptive to the classroom environment. Teachers need to be able to identify these children in order to prevent their mislabeling as troublemakers and to end the possibility of initiating a vicious cycle of problem behavior. Secondly, since SI dysfunctions are disorders or immaturities in the development of an effectively functioning neurological system, the earlier these problems are discovered, the sooner remediation and therapy may begin. That is, the older a child becomes before diagnosis, the more ingrained behaviors become, (Ayres, 1979, 59). By being equipped to detect and help the SI dysfunctional child in the classroom, teachers can learn to help many of these children to adaptively function and eventually succeed in the pursuit of an education.

What exactly is sensory integration?

Sensory integration is the natural and normal functioning of the brain that occurs in every developing child, (Young 1987, 37). It is the neurological organization of our senses. That is, it is the process by which we take in information from our surroundings and make sense of it. Our bodies are constantly receiving enormous amounts of stimulation through

our sensory receptors. We receive this stimuli, take it in, organize, analyze, and synthesize it. Finally, we respond to the stimuli.

It is through a constant and immediate ability to respond to our environment that we are able to move, learn, speak and interact with others efficiently. If something goes awry in the development of the integration of the senses, there are many consequences that will effect the development of more complex abilities.

When we speak about the senses, automatically one thinks of the eyes, ears, nose, skin, and taste buds. However, these senses are only part of the picture. What many people do not realize is that we also have what is referred to as the "near senses", which are composed of the vestibular, proprioceptive and tactile receptors, (Kranowitz,1994,2). It is not until the near senses develop that we may develop and integrate the use of our far senses, those dealing with sight, hearing, touch, taste, and smell. Therefore, the near senses are the building blocks for later and more mature development such as learning to read and write.

The first of the near senses, the vestibular system, functions through the input of stimuli in the inner ear. The inner ear sends messages to the brain about the various changes in body positioning. The brain then responds ensuring that we are always in balance, constantly adjusting and responding to different gravitational pulls. This is the system that tells us about our relationship with gravity and space, (Trott, 1992, 14-21).

The second of the near senses is the proprioceptive system. This system receives its information about body positioning through our muscles, joints, and ligaments. The receptors in this system tell the brain what the body is doing and thus, allow us to move naturally and with little conscious cognitive effort, (Nolan,1994,10).

The last of the near senses is the sense of touch, or the tactile system. The receptor for this sense is our skin. We all use our hands and skin to discriminate between different objects. What we do not realize is that earlier in our growth, we developed the ability to discriminate between threatening and non-threatening tactile stimuli in an effort to defend ourselves from this noxious stimuli. As a result, we have acquired the protective ability to remove our hand from a hot flame. This may be referred to as a motor reflex response because it is automatic, (Kranowitz, 4). Not until this more primitive tactile ability is established may the brain develop the more advanced discriminative ability of touch. t is this discriminative ability provides information about the quality of objects in the environment, (Nolan,11).

Why are the near senses so important? It is through these senses that we first learn about the world and how we relate to it. Our bodies become defined in space and distinct from the objects and people around us. Through the near senses, we are able to establish a sense of security with the ground in order to be able to move and explore. They help us develop a sense of balance, control, and coordination so that we may experience the world around us, (Nolan, 1994, 1). Not until we are able to move with ease and process basic sensory information is it possible to develop the more complicated self-regulating or cognitive functions necessary for school life. Thus the near senses and their efficient functioning are referred to as the building blocks of later growth.

What happens when something goes wrong: Sensory Integrative Dysfunction

For most children, sensory integration works well from an early age. For some, however, neurological systems may be immature or inefficient resulting in difficulties in

sensory integration. Estimates range from 15 to 20 percent of the general population are sensory integrative dysfunctional, (Kranowitz, 4). In these cases, because the brain is not processing input effectively, overall development is disorderly, (Kranowitz, 26). This is a difficult statistic to determine, however, in that many children who are affected by sensory integrative dysfunctions remain undetected. This may be because there is a tendency for many parents and professionals who are unaware of the significance of sensory integration issues to dismiss the somewhat unusual behaviors by claiming that the child "will outgrow" this awkward or difficult stage. Another explanation may be that there is no clear delineation as to at what point SI functioning becomes "abnormal." The general population will fall anywhere along a spectrum of levels of functioning.

In all human beings, regardless of the level of SI functioning, it is the brain which is responsible for processing incoming stimuli. In the case of SI dysfunction, the brain either facilitates or inhibits sensory input from receptors. Therefore, sensory integration dysfunction may be referred to as the under- or over-registration of stimuli, (Nolan,3).

Disorders involving an under-registration occur when input is not registered with sufficient intensity for it to be processed by the brain efficiently. A child in this situation will constantly crave sensory stimulation in an attempt to compensate for this deficit in sensory input. An over-registration will occur when the brain is overloaded by a lack of filtration of stimuli, and the brain will be overwhelmed by the influx of stimulation. Thus SI dysfunctions occur because the brain is not processing sensory information efficiently and cause overall development to be disorderly. When this occurs, even seemingly simple and ordinary tasks become difficult.

The Hyporesponsive Child

In a hyporesponsive child, the brain inhibits stimuli so that the body does not receive adequate input from the senses. Unable to receive adequate input, he will crave and thus, seek any type of sensory feedback such as touch or movement in an attempt to satisfy a most basic and primitive desire for sensory stimulation.[1/]

A child with a hyporesponsive vestibular system will crave movement. This is the child who cannot sit still. He is constantly in motion because it is only with excess sensory stimulation that he is able to maintain an optimal level of functioning, (Nolan,4). Teachers may ironically label this child as "hyperactive," and because the child cannot sit still, he may be a constant source of disruption to classroom activities.

I met a child like this while I was conducting research for this project. When I entered the waiting room of the Washington Developmental Center, Peter** was almost literally bouncing off the walls. He ran from one corner to the other, alternating between hitting his mother and rocking vigorously in a rocking chair. In actuality, Peter's brain was inhibiting stimuli from reaching his body. Thus it was up to him to find the stimulation that he so desperately needed to function.

When the brain is hyporesponsive to both vestibular and/or proprioceptive input, a child may exhibit low or floppy muscle tone due to the fact that his muscles have been deprived of adequate stimulation, (Nolan,5). For this reason, he may have a difficult time in sitting upright in chairs or in remaining seated in one place for a period of time. Teachers

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[1/]* Since approximately 80% of those children who are diagnosed with SI dysfunctions are male, the author will take the liberty of using "he" to refer to the sensory integrative dysfunctional child (Kranowitz, 1994). The author recognizes that this is a generalized portrayal of the facts but chooses to do so for purposes of simplicity.

may view the child with this particular dysfunction as unmotivated, lazy, or disrespectful. In reality, this behavior is due to a neurological problem and not to an inherently "difficult" child.

A child with a hyporesponsive proprioceptive system will exhibit poor orientation in space. This child will not be able to delineate the boundaries of his own body, (Ayres, 1979, 17). Thus, this child may be prone to tripping and bumping into things frequently. Effects such as these may have a detrimental impact on the healthy development of self-esteem. Realizing his clumsiness, this child may designate himself as the "class clown" and cope with this dysfunction by making light of situations in which he has difficulties. By looking past the inappropriate antics of this child and detecting a neurological immaturity, teachers can break this cycle.

A child with a hyporesponsive tactile system will have a diminished sense of touch. This is the child who picks up a hot pan without realizing the danger of being seriously burned, or the child who may be entirely unaware of the huge bruise on his forehead, (Kranowitz, 1994). A child with a hyporesponsive tactile system may appear particularly disheveled and disorganized. Teachers may conclude that because this child is constantly dropping items or has a messy appearance that he is not "applying himself," when in fact, it is that the child is inefficiently processing tactile stimuli and is unable to readily decipher tactile input.

The Hyperresponsive Child

A hyperresponsive child is one whose brain is overly responsive to incoming stimuli. The child may also be described as "sensory defensive", (Nolan, 5). In a sensory defensive

child, sensory input is facilitated to the extent that the brain becomes overwhelmed and is unable to function efficiently. As a result, what appear to be innocuous stimuli for most children become threatening and invasive to the sensory defensive child. Thus, this child may dislike many activities such as art projects involving messy paints or clay or physical education classes involving substantial amounts of motion. He may, as a result, appear to others as reluctant, difficult, and stubborn in nis aversion to such activities.

In the case of the near senses, a child with a hyperresponsive vestibular system will react adversely to movement. This child may be referred to as "gravitationally insecure," (Ayres, 1979, 83). Even slight movement will be perceived by this child as overwhelming, especially those movements in which the head is inverted. Because he is facilitating sensory input, a child with a hyperresponsive vestibular system perceives this type of movement as threatening and detrimental to his relationship with the world. By avoiding certain types of play, children with a hyperresponsive vestibular state will appear rigid in a physical and often, in an emotional sense. A child's insecurities in this sense may also prohibit the development of feelings of security with oneself and in the development of interpersonal relationships (Nolan,3).

A child with a hyperresponsive tactile system is entirely the opposite of his hyporesponsive counterpart. This child perceives even slight touch to be uncomfortable, painful, and often dangerous to his well-being. This is the child who cannot stand in line because he cannot tolerate other children in close proximity to him. This child does not like messy activities because of the sensation of having paint or mud all over his fingers. Overall, the tactile defensive child will be fussy about textures of food, clothing, and many play activities, (Trott, 18).

How SI dysfunction can become a problem in the classroom

With a clearer understanding of the effects of sensory integrative dysfunction on behavior, it should be evident that these children may place an added burden on a teacher's already overwhelming task of managing a classroom. In the previous sections, examples have been given in regards to various ways in which SI dysfunctions can pose challenges and cause problems for students in the classroom. Particularly, children with SI dysfunctions will have difficulties in controlling aggression, motor planning and maintaining alertness. These children will need the help of teachers to stabilize their learning environments and by doing so, teachers may help children with SI dysfunction make the most of their school experience.

Unable to determine his boundaries and struggling to accurately modulate sensory input, a child will have difficulties in learning to appropriately interact with peers. As a result, he may act in ways that may seem violent or intrusive when in fact, it is that he is unable to effectively modulate expressions and actions. For example, this child may talk too close to others unaware of others' personal space or he may push too hard while playing tag. Furthermore, when a child with a hyperresponsive tactile system encounters stimuli that he perceives as dangerous, he may lash out in anger or aggression thereby taking a "fight or flight" stance in defense of his well-being, (Ayres, 1979, 86). Hyperresponsive children may be viewed by both teachers and their classmates as "weird" and eccentric, as well as difficult and hostile with a tendency to overreact. Other children may shun the SI dysfunctional child who behaves in these ways and thus, the dysfunction will affect the social aspects of his school life.

Motor planning is the ability of the brain to process information, organize it, and finally, to carry out a sequence of actions (SI Quarterly,1993,10). Efficient motor planning involves the contribution of accurate information from sensory input, and consequently, children with SI dysfunctional neurological systems will have significant difficulties in motor planning. Having to concentrate on the coordination of movements, the sensory integrative dysfunctional child will find the abstract, cognitive process of sequencing activities difficult. Since this sequencing is essential to many higher cognitive functions such as learning to read and write, accomodations must be made. Teachers may think a student is goofing off or not listening when, in reality, the child may be unable to start a project or be unable to follow a multiple-step direction, due to a deficiency in his ability to motor plan. He may also have difficulty in finishing work on time, while another child with this deficiency might rush through an assignment without carefully planning the appropriate steps necessary for completion. This second child will often turn in messy and poorly-thought out work, (SI Quarterly,10).

The importance of maintaining alertness throughout the day is essential to optimum performance in classroom activities. A normal state of arousal develops as a result of the body's ability to regulate or modulate sensory input,(Trott, 15). A child with SI disorders may be unable to maintain this optimal state of calm and alertness throughout the school day, and thus, find it difficult to take in information and process it effectively, (Trott, 14).

If a child is overstimulated by events in a classroom, it will be impossible for him to understand what is going on around him, let alone for him to respond in an appropriate manner. This is evident in the child who cannot sit still for any length of time, certainly not long enough to complete tasks. This child engages in constant activity yet seems unable to

engage in purposeful tasks. On the other hand, if a child lacks a sufficient state of arou al, it will also be difficult for that child to attend, learn, and behave accordingly. The child with a low state of arousal will appear as if he is tired or bored. Teachers may refer to this child as lazy or difficult to please. Since it may take more to motivate this child, teachers may see this child as reluctant to learn.

A child without the ability to regulate their own sense of arousal will need a teacher to structure classroom activities in a way that will enable a child to function and participate in class activities.

In the classroom...

Managing an elementary classroom may be the most daunting of all tasks that a teacher must face. Establishing a sense of organization and control while still providing effective instruction may seem an overwhelming prospect to many teachers. Day-to-day classroom management coupled with the task of managing a child with sensory integrative dysfunctions, may seem all the more likely to break a teacher. However, by incorporating certain techniques into one's classroom management repertoire, it becomes possible to effectively run a classroom. By becoming sensitive to individual learner needs, those with or without SI dysfunction, teachers may provide an optimum learning environment for all students. This preventive approach to teaching stresses structuring the physicality of a classroom, incorporating techniques in order to provide overall effective instruction, and maintaining an overall flexible style of teaching.

Setting up a classroom

There are ways to make learning easier for children with SI dysfunctions. By structuring the classroom environment to minimize distraction, a child with SI dysfunctions may flourish in a school setting. For example, a child who is tactile defensive will become irritable and distracted when in close contact with other children. Experiencing the proximity of others as a threat to well-being, this child may benefit from being placed in a less congested, less-frequently traveled pathway or at the head of a group of children.

Spyropulos (1990) emphasizes the importance of proper desk and chair height for these children. Often these children lack well-developed muscle tone and need this proper support to maintain body alignment and postural stability, (12). Children with poor proprioceptive development and the resulting poor muscle tone, may benefit from the use of a hippity hop to aid in postural development. By practicing balancing on this large ball, the child is forced to concentrate on his muscular control thereby strengthening the involved muscles.

Teachers working with children with SI dysfunction should provide their classroom with an area to which a child may "escape." Some teachers equip the book area with soft pillows, beanbag chairs, and cuddly blankets. Sometimes children may also seek comfort in the slow, soothing movements of a rocking chair. A child feeling overwhelmed may seek refuge in this quiet and infrequently-traveled area in an attempt to calm himself, (Bissell, 1991, 9).

Teachers may also seek the help of headphones for an SI dysfunctional child. By providing extra auditory stimuli, the hyporesponsive child will be less likely to crave sensory stimulation and thus be more apt to concentrate on tasks. The hyperresponsive child will

benefit from the use of headphones that provide neutral sounds such as white noise or calming sounds such as peaceful music that will serve to block out the oftentimes chaotic noise in an elementary classroom, (Anderson-Ewald,1993,10).

Furthermore, the group time area in an early childhood classroom should be structured with SI dysfunctional children in mind. Many of these children need clear boundaries to be established such as rug squares or a taped "X" on the ground. (This use of delineated areas of floor space can also help to make lining up a less intimidating routine for a sensory defensive child.) Other children feel more secure when seated against a wall or in a beanbag chair for support, (Strimple and Snell, 1994). Through the implementation of these suggestions, group time, which often poses a great threat to many SI dysfunctional children, can become a more reassuring and thus, valuable learning experience with a teacher's help and understanding.

Instruction time

Teachers must also make the necessary accommodations while planning instruction time. Periods of intense work should be interrupted by an activity that allows for movement. An activity that provides for a change of setting or allows children to move around will help the child who craves stimulation. A multisensory approach to learning, which is optimal for all young learners, will aid those children needing extra sensory stimulation by providing the opportunity for children to practice integrating the use of all of the senses in learning.

In addition, when scheduling lessons, teachers must remember to remain consistent. Children with disorganized sensorimotor systems rely on such consistency as a stabilizing force in the school day. Thus, careful attention should be made to times of transition in

these classrooms. Teachers should provide a good deal of structure during these times such as oral notice of an impending transition and perhaps continuing verbal guidance throughout what can be chaotic times.

As was discussed earlier, one of the ways in which children with SI dysfunction will struggle in the classroom is during activities that require extensive motor planning and the execution of sequenced directions. Teachers in these situations may provide extra structure by breaking down directions into individual steps or by writing directions down on the blackboard or repeating directions several times. Providing a checklist of steps may also help allow children to visualize the breakdown of individual steps and monitor the process of completing steps, (SI Quarterly, 10). The teacher may also begin with shorter assignments to allow students with planning difficulties to experience a sense of accomplishment in these kinds of activities. The teacher may also help a child get started by physically aiding him in the first steps of an assignment.

Spyropulos also suggests the implementation of several techniques for clear presentation of information that will help SI dysfunctional children within the classroom. She advocates the use of xeroxes with clear, crisp print as opposed to dittoes on which letters may be more difficult to discriminate. Chalkboards should be kept extra clean so that letters appear crisp and are thus more easily distinguishable. A variety of sizes of pencils should be made available since no one size is appropriate for all children, (12).

Flexibility in teaching

When working with children with SI dysfunctions (or any young children), it is essential that teachers remain flexible in their teaching styles. For example, a flexible teacher will allow children who truly need it to stand or move to a quieter area in order to

remain on-task and avoid being disruptive. In addition, allowing a child to fidget with a small item (clay, pencil, paper clip, or koosh) may also keep children from being distracted or irritated. Other suggestions include asking a child with SI dysfunctions to run an errand when it seems as if he is about to "lose it". These simple adjustments can prevent that child from disrupting other children in the class and help to maintain overall classroom control.

A teacher may find that s/he may benefit from providing additional attention in a physical sense. For example, simple pressure applied on the shoulders, head, or body can help to prevent a SI dysfunctional child from straying off task by providing the extra sensory stimulation needed to stabilize neurological activity. For somewhat unexplainable reasons, this gesture often works well with both hypo- and hyperresponsive children. A teacher may apply deep, firm pressure in the form of a hug or pressure applied on the head or shoulders to a child who seems to be losing his concentration.

It may also be necessary for a teacher to try many different approaches to teaching a particular subject before an optimum style is discovered. Certain students with SI dysfunctions may require a more teacher-directed approach as opposed to a more student-oriented style of learning. It is impossible to determine which of these is best suited to a specific group of children and a period of trial-and-error may be required. By responding to every child's individual learner needs, a teacher may help children with and without SI dysfunctions to work at top performance in the classroom.

In conclusion

As adults, we tend to take for granted our ability to efficiently integrate sensory input. We either have been blessed with well-developed neurological systems that provide us with

this ability or we have somehow learned to compensate for our deficits. For young children to whom the world is an exciting and new experience, the inability to integrate sensory input can seriously harm the pursuit of a fulfilling educational experience.

This paper sought to provide teachers with knowledge of sensory integration and also with strategies to make classrooms more inviting to children with SI dysfunctions. Teachers must also realize however, that they are not solely responsible for the detection or remediation of the difficulties caused by SI dysfunctions. Teachers may benefit immensely from the support of colleagues, the administration, parents and support services such as occupational therapists.

As is true in any teaching environment, the refuge of understanding ears in a teachers' lounge can sometimes take the edge off slowly eroding patience. Colleagues may also be able to share their experiences and successes in dealing with the difficulties brought on by problems in students' sensory functioning. The administration may also be a ripe source of aid in coping with the sometimes overwhelming circumstances in a demanding classroom. By supporting teachers in their efforts, the administration can greatly help to alleviate teacher stress. Opening the communication pathways with the parents of SI dysfunctional children can also help both parties to better aid the child. Adults can work together to find ways in which they may better help the individual student adjust to classroom environments.

Finally, teachers must look to the support of services made available to these children under Public Law 94-142 and the more recent Individuals with Disabilities Education Act, (IDEA, 1990). Under these laws, many children with SI needs are provided the help of special educators such as occupational therapists. By creating a team, teachers and other

adults who are involved in the lives of SI dysfunctional children can help to make a somewhat intimidating experience more enjoyable. By seeking the collaborative efforts of educators in a school system, teachers will be able to give students the time, patience and understanding that is necessary in these special learning situations. In doing so, this team is creating an environment in which each child remains alert and on-task, and as a result, optimal learning will be achieved.

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Organization: The American University, School of Education

Position: Masters Candidate

Address: 3625 38th St NW #304, Washington DC

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